

Apparatus for removing and erecting a folding-box blank

Technical Field

The invention relates to an apparatus and to a process for removing a folding-box blank from a magazine and for erecting the same.

Background of the invention

An apparatus of the generic type is known from EP-A-0,182,967. This apparatus has a gripping arm which has suction grippers and by means of which a folding-box blank is removed from a magazine. The gripping arm is then pivoted and displaced in a translatory manner in order to move the blank to a stationary abutment, which likewise has suction grippers. As soon as the abutment has gripped the rear side of the blank, the gripping arm is pivoted away again, with the result that the box is erected.

DE-A-29,37,129 discloses a further carton-erecting means. This carton-erecting means has a removal unit which can be displaced perpendicularly to the magazine stack and has suction grippers for gripping a carton blank. When the blank is removed, it is opened slightly by a tongue-like element. The carton is then opened further, and erected, during continued lowering movement of the removal unit, by way of a two-legged supporting element, the legs of which can be changed in respect of their angle in relation to one another by means of compressed air.

Further erecting apparatuses are known from DE-A-39,30,720, EP-A-0,434,961, DE-A-39,41,866 and EP-A-0,440,940. These apparatuses have multi-armed star-shaped rotors, of which the arms are provided with

suction grippers. In each case one arm removes a blank from the magazine stack, by attaching a first box wall by suction, and transports the latter over a circular path. During the transportation, a lever arm which is arranged laterally on the arm is then actuated, the lever arm pressing on a second box wall, which is adjacent to the first box wall, and thus erecting the box.

The known apparatuses have the disadvantage that they take up a relatively large amount of space. In addition, they require a relatively long period of time for the removal and erecting operations, because the blank has to be transported away from the magazine before it can be erected.

Summary of the Invention

It is therefore an object of the invention to provide an apparatus and a process which are intended for removing a folded-box blank from a magazine and for erecting the same and which eliminate the abovementioned disadvantages.

This object is achieved by an apparatus having a first retaining means for removing the folding-box blank and a second retaining means for erecting the folding-box blank by virtue of the second retaining means being moved relative to the first retaining means, the first retaining means having means for gripping a first box wall and the second retaining means having means for gripping a second box wall, which is adjacent to the first box wall, wherein the first and second retaining means can be arranged such that they grip box walls located on the same side of the folding-box blank.

This object is further achieved by a process for removing a folding-box blank from a magazine and for erecting the same, comprising the steps of removing the

folding-box blank by a first retaining means and erecting the folding-box blank by virtue of a second retaining means, wherein moved relative to the first retaining means, the first retaining means grips a first box wall and the second retaining means grips a second box wall, which is adjacent to the first box wall, wherein the first and the second retaining means grip the box walls on the same side as the folding-box blank.

It is thus also possible for the second box wall to be gripped at a relatively early point in time, preferably even during removal from a magazine stack. The box can be erected relatively soon after the removal operation. Since the folding-box blank removed need not first be moved to an erecting location, time and space are saved.

It is advantageous that the folding box does not have to be released from the point in time of removal from the magazine until the box is adhesively bonded. Furthermore, it is advantageous that two box walls can be gripped during removal from the magazine. The box blank is thus retained in a more reliable manner. A further advantage is that it is possible for different folding-box formats to be gripped, and erected, with the retaining means unchanged, as a result of which format-changeover parts are dispensed with.

In a preferred embodiment, the two retaining means can be moved both with one another and in relation to one another, these movements preferably being executed, at least in part, simultaneously. It is preferably possible for them to be swung relative to one another through a swing-action angle, jointly pivoted and jointly displaced in a translatory manner. If at least the pivoting and swing-action movements are executed, at least in part, simultaneously, then the operation of

erecting the box can begin even during removal of the blank.

Further advantageous embodiments can be gathered from the dependent patent claims.

Brief Description of the Drawing

The subject matter of the invention will be explained hereinbelow with reference to a preferred exemplary embodiment which is illustrated in the attached drawing, in which:

figure 1 shows a perspective illustration of the apparatus according to the invention during removal of a folding-box blank;

figure 2 shows the apparatus according to figure 1 at a subsequent point in time;

figure 3 shows the apparatus according to figure 1 with the box partly erected; and

figure 4 shows the apparatus according to figure 1 during the operation of swinging in a folding tab.

Preferred embodiments

Figure 1 illustrates an apparatus according to the invention. The apparatus has a base 1 with a guide track 1'. A carriage or sled 2 is arranged on the guide track 1' such that it can be displaced in a translatory manner. The translatory drive means 3 provided here is a belt drive with a belt 30 which runs parallel to the guide track 1' and on which the carriage 2 is fastened. The belt 30 runs around a deflecting roller 31 and a drive roller 32, the latter being driven by means of a first motor 33.

A parallelogram linkage 5 is arranged in a pivotable manner on the carriage 2. Its pivot axis here preferably runs perpendicularly to the plane of the guide track 1'. A pivoting-drive means 4 with a second motor 40 has been provided for this purpose, said motor transmitting a pivoting movement to a first end of the parallelogram linkage 5, this end being arranged on the carriage 2.

Arranged at a second, free end of the parallelogram linkage 5, on in each case one rod or bar 50, 51 in the parallelogram 5, is a retaining means 6, 7. The retaining means 6, 7 each have a spindle 60, 70 running perpendicularly to the parallelogram 5. Arranged at the top end of each spindle 60, 70, said end being directed away from the parallelogram 5, is a carrier bar 61, 71, which runs transversely to the spindle. Suction grippers 62, 72 are fastened on the carrier bars 61, 71 in order to grip a folding-box blank Z.

Also arranged on the parallelogram linkage 5 is a swing-action drive means 5', in order that the two retaining means 6, 7 can be swung relative to one another. For this purpose, a crank drive 52 with a crank 53 is provided on the first bar 50, on which the first retaining means 6 is arranged. The crank drive 52 is preferably pneumatic. A connecting rod 54 is fastened on the crank 53 and is connected, via a connecting crosspiece 55, to the second retaining means 7, and more specifically to the second spindle 70. It is thus possible for the second spindle 70 and thus the second carrier bar 71 to be swung in relation to the first retaining means 6. The swing-action angle is usually 90°. However, it depends on the shape of the box erected.

Figure 1 illustrates how the folding-box blank Z is removed from a magazine stack. For this purpose, the

first and second retaining means 6, 7 are pivoted in the direction of the magazine stack by means of the parallelogram 5 or the pivoting-drive means 4. The retaining means 6, 7, which in this state are aligned along a single line, grip two preferably adjacent box walls W1, W2, which are located on the same side of the blank Z. In the example illustrated here, the second retaining means 7 also already grips its box wall W2 at this point. However, it is also possible for it only to be moved, in particular pivoted, into this position following removal.

As can be seen in figure 2, the retaining means 6, 7 are moved away from the stack by virtue of the parallelogram 5 being pivoted. It is preferable here to begin the swing-action movement as soon as sufficient space is available. In the state illustrated, the second retaining means 7 has thus already been swung to a slight extent in the direction of the first retaining means 6. In order that the box walls of the collapsed blank Z actually separate, an opening means 10 is preferably provided. This can best be seen in figures 3 and 4. It preferably comprises a tongue or a rod which engages through between the folding tabs F of the adjacent box walls W1, W2 even during removal and is preferably immediately drawn back again. It is also possible, for example, for an air nozzle to be used as the opening means 10.

In the state according to figure 3, the second retaining means 7 has reached the predetermined swing-action angle of 90° and the box is now partly erected. As can be seen in figures 2 and 3, the first retaining means 6 or its carrier bar 61 preferably maintains its orientation relative to the stack of the magazine during the pivoting movement of the parallelogram 5, with the result that the bar 61 is drawn away perpendicularly from the stack surface during the

pivoting movement and in the longitudinal direction in relation to the same during the translatory movement.

In figure 4, the first and second retaining means 6, 7 have now been transported in a translatory manner, by means of the carriage 2, to a transfer location for the box. During this transportation, the rear folding tab F, which is remote from the transfer location, is folded in by a folding-in means 9. The folding-in means 9 is preferably arranged on the second retaining means 7, and more specifically on the second carrier bar 71. It has a folding-in bar 90, which can preferably be actuated by means of a pneumatic pressure cylinder 91. The folding-in bar 90 forces the folding tab F upward and remains in this position until the box is transferred, at the transfer location, to a following station. The rest of the folding tabs are usually swung round by known means, for example lateral and front guides, before the transfer. Once the box has been transferred, the apparatus can be moved back again into the starting position according to figure 1.

The above described movement sequence may be modified. Individual movements may be executed one after the other or simultaneously. The translatory movement may also be combined, for example, with the swing-action and pivoting movements. It is also possible to use other movement means instead of the carriage and the parallelogram. Suitable drive means, in particular, are servomotors, pneumatic drives or three-phase alternating-current motors.

The apparatus according to the invention has two retaining means which can be moved in relation to one another and are intended for gripping two box walls located on the same side. This allows the folding-box blank to be removed and erected in a space-saving and efficient manner.

Reference numbers

Z	Folding-box blank
F	Folding tab
W1	First box wall
W2	Second box wall
1	Base
1'	Guide track
2	Carriage
3	Translatory drive means
30	Belt
31	Deflecting roller
32	Drive roller
33	First motor
4	Pivoting-drive means
40	Second motor
5	Parallelogram linkage
5'	Swing-action drive means
50	First bar
51	Second bar
52	Crank drive
53	Crank
54	Connecting rod
55	Connecting crosspiece
6	First retaining means
60	First spindle
61	First carrier bar
62	First suction gripper
7	Second retaining means
70	Second spindle
71	Second carrier bar
72	Second suction gripper
9	Folding-in means
90	Folding-in bar
91	Pressure cylinder
10	Opening means

The entire disclosure of Switzerland Patent Application No. 2002
2079/02 filed December 6, 2002 is hereby incorporated by reference.